

## Country Report:

### Japan

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Japan has been participating in the GLOBE Program since the autumn of 1995. GLOBE Japan Center, which was organized by the Japanese Country Coordinator, has been promoting GLOBE activities in Japanese schools. In 1995 and 1996, the important roles of GLOBE Japan Center were to suggest the significance of GLOBE activities and to advise about the measurement protocols for GLOBE schools. Furthermore, it was also important that GLOBE Japan Center provide information on technical methods of Internet connection. The GLOBE school, which resolved technical problems such as measurement protocol and Internet connection, has been examining the introduction of GLOBE into the school curriculum and activities. From three years ago, many GLOBE teachers have been giving GLOBE Japan Center the impression that the discussion of the introduction of GLOBE into the school curriculum is an important issue in Japan. In this report, the author describes the relation between GLOBE activities and the school curriculum in Japan. Moreover, as a feature of GLOBE Japan, EILNet program originating from GLOBE activities in Japan, is introduced in this report.

#### **1. GLOBE and school curriculum in Japan**

The present education in schools of Japan is controlled by the Course of Study, which was revised in 1989 and includes teaching subject, educational objectives and educational contents. Therefore, the discussion of the introduction of GLOBE into the Course of Study is important in school, especially in the case of making educational plans for GLOBE to be introduced in school subjects such as Science and Geography. Many GLOBE teachers have been examining and making a plan for GLOBE to be implemented into several subjects, such as Science and Social Studies (Geography). However, it is not always possible for GLOBE teachers to implement GLOBE measurement activities during regular class because each subject has many requirements under Course of Study. In many GLOBE schools, GLOBE measurement activities have been implemented at the school but not during regular class hours. (That is Special Education Activities such as student club and student council regarded as a school time.) In reference to the above description, GLOBE activities such as studying about environmental significance and the scientific value of GLOBE have been

conducted as part of some subjects such as Science and Geography. However, in many GLOBE schools, student clubs or student council conduct the measurement activities.

Based on the reports of the Central Council for Education and the Curriculum Council of Japan, the Ministry of Education, Science, Sports and Culture proposed a plan for a new Course of Study to be enforced from 2002. The new Course of Study provides a new class hour, called the Period for Integrated Study. The Period for Integrated Study will be implemented at the rate of three class hours (one class hour is about 45 minutes), and two or three class hours per week, respectively in elementary and lower secondary schools. In the case of upper secondary schools, the new class hour will be implemented one or two hours per week from 2003 on. The objective of this new class hour is to encourage motivation for studying and to improve the problem-solving capabilities of students. However, there are no rigid rules on the content of the class. Therefore, each school will have the right to decide what kind of educational content is implemented in this class hour, although the Ministry of Education, Science, Sports and Culture has indicated education about the environment, welfare, international understanding, and information understanding, as examples of the comprehensive education to be taught during the new class hour. The Ministry of Education, Science, Sports and Culture has permitted that schools to carry out the educational plan using the Period for Integrated Study on a trial basis from 2000 despite the fact that the official start will be 2002 or 2003. Schools have been trying comprehensive educational activities in a new class hour since last year, and some GLOBE schools also have been conducting educational activities related to GLOBE in the new class hour.

Following is an example of the experience of a GLOBE school. Students of the science club of this school have conducted some measurements on the atmosphere and water according to the GLOBE protocol and presented the results of GLOBE activities during their school festival. Students of another grade heard their GLOBE presentation at this festival, and then created a plan for a river survey as an activity for the new class hour. After making a survey plan, they tried to observe the river landscape and water quality at several places along a river near the school. From the above example of this lower secondary school, we can see a good lesson that measurement activities of GLOBE led to an awareness of the natural environment not only by students participating in GLOBE, but also by other students. If a school wants to try the educational activity on GLOBE and environment in the new class hour, it will be allowed in a new class hour beginning in 2002.

## **2. EILNet related to GLOBE in Japan**

EILNet Program is one feature of GLOBE Japan. In EILNet Program, the staff of Tokyo Gakugei University proposed some measurements on the environment. Students of each school go outside to observe and perform environmental measurements such as air temperature, water quality, food culture, acid deposition, etc. Next, they generate results from the environmental data. The final step is the extension of the results of environmental observations and investigations to the students of other schools in EILNet. The Internet plays the major role in the activity of extension: students publish the results and discussion of their activities on the Home Page of their school and learn about the environment of other EILNet schools through the Internet. The aim of this program is to interest EILNet students in environments of both their own region and other regions.

The activities proposed by the staff of Tokyo Gakugei University are “Heat Island Phenomena”, “River”, “Acid Deposition”, “Dandelion Ecology”, “Sound Hearing”, and “Food Culture and Life Style”. Each school selects from among these activities, and students conduct them during various classes, such as science, social studies, music, art, science club, etc. Below are descriptions of each proposed activity.

Heat Island Phenomena Program (<http://www.fsifee.u-gakugei.ac.jp/EILNet/eilheat/eindex.htm>); The aim of this program is understanding how activities of every day life affect the physical environment around us by measuring air temperature. The Home Page (<http://www.net-ibaraki.ne.jp/ndai-jhs/>) shows how students make simple air temperature measurement equipment from sturdy paper and cardboard that prevent interference by solar radiation. After making this simplified equipment, students measure the temperature at several observation sites near their school. Students examine differences of temperature among the observation sites by drawing a map, and gain an understanding of heat island phenomena.

River Program (<http://www.fsifee.u-gakugei.ac.jp/eilnet/eilriver/eindex.html>); In this program, students observe the landscape of a river, take photographs or paint pictures of the river, examine the river basin using maps, or measure water quality using GLOBE protocols and bio-indicator methods such as insect and worm surveys in river water. This program leads to integrated thinking about the river and its environment. There are not only water quality measurements generally conducted, but also other investigations of geographical and sociological features.

Acid Deposition Program ([http://www.fsifee.u-gakugei.ac.jp/eilnet/acid\\_rain](http://www.fsifee.u-gakugei.ac.jp/eilnet/acid_rain)); To understand the phenomenon and mechanism of acid deposition (both wet and dry) in air, students of some EILNet schools measure the pH of rain fall and the change of weight of standardized marble pieces at several times throughout the year. The weights of marbles that have been exposed to the atmosphere for several months, and the electric conductivity of the water solution used for washing the surfaces of the marble pieces are measured at intervals of three months, and compared to a control marble which has been isolated from atmospheric conditions.

Dandelion Ecology Program (<http://www.fsifee.u-gakugei.ac.jp/eilnet/dandelion>); We have two types (native and introduced species) of dandelion in Japan. There is a trend that the place influenced by development such as housing has a high ratio of introduced species. Students go out of school to observe dandelions in the area near school and sketch the ratio of the native type to the introduced one on the map of the survey area. One of the aims in this activity is to understand the relation between land development and ratio of native dandelion type.

Soundscape Program (<http://www.fsifee.u-gakugei.ac.jp/eilnet/soundscape>); By hearing natural sounds such as wind, birds etc., students learn to discriminate between natural and artificial sounds and understand changes of the natural environment in their residential areas. After the outdoor activity, students arrange their individual results by drawing figures, and comparing the differences of sounds at the several locations.

Food Culture and Life Style Program (<http://www.fsifee.u-gakugei.ac.jp/eilnet/eilfood/index.html>); The aim of this activity is knowledge of the regional variation of food culture and understanding of the environmental factors influencing regional food culture. Students survey the consumption of food in everyday life and on special dates, and they examine aspects of their regional lifestyles related to food. The students exchange the results with other EILNet schools through the Internet.

The above programs were proposed by the staff of GLOBE Japan Center at Tokyo Gakugei University. Additional learning programs will be added in EILNet, because there will be new themes on the environment through both GLOBE and the EILNet Programs. During the educational or survey activities of GLOBE, students will observe the other phenomena of the natural environment. Next, students may become interested in new themes of local and global environments, search for information on new themes, and investigate solutions to various problems. There should be a support system for problem-based learning in GLOBE schools. GLOBE Japan Center may play a role in supporting students.

## Country Report

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GLOBE in Japan started in the fall of 1995. We have the seven years experience of GLOBE activities. As the Internet system was insufficient system in Japanese school education seven years ago, the support and advice regarding the Internet and data submission to GLOBE schools was one of the main tasks of the GLOBE Japan Center when GLOBE started. However, there was a rapid expansion of the Internet into the school system in the 4 years since 1995; many schoolteachers also have gained the knowledge of the Internet. We think that the foundation of GLOBE activities has been established for the past 2-3 years. In this country report, we show the summary of Japanese GLOBE activities for the past 2-3 years and the themes of future activities of GLOBE in Japan.

### **The Adaptation of GLOBE in New School Curriculum in Japan**

There has been a problem in the adaptation of GLOBE to the Course of Study of Japan since GLOBE started, because the Course of Study has fixed the educational parameters of each subject in the school curriculum. Thus the GLOBE teachers in schools did not have many chances to implement the GLOBE Program. Although the meaning of GLOBE and its measurement was taught in science classes, GLOBE measurement activities in many schools have been implemented at the school but not during regular class hours. ( That is, 'Special Education Activities' such as student club and student council regarded as school time.) Recently, there have been new chances to implement GLOBE in schools. The Ministry of Education, Science, Sport, Culture and Technology (MEXT) proposed a new period in the school curriculum in 1998. The name is the Period for Integrated Study.

One of the aims in the Japanese GLOBE activities for the last 2 years has been to examine a smooth integration with the Period for Integrated Study that started from this April as a new Course of Study in Japan. The educational objectives and targets in this new school period already were written in a former Abstract in the Sixth Annual GLOBE Conference. MEXT permitted the school to try the educational activities as a part of the Period for Integrated Study from the year 2000, although the new Course of Study hadn't formally started. Some GLOBE schools tried to conduct as of the educational activities of GLOBE as part of the school period of Integrated Study and obtained positive results in the inquired leaning method. Although the Course of Study doesn't show the detailed themes on educational quality in the Period for Integrated Study, the themes of international understanding, information education,

environmental education, and welfare education are suggested as examples. Therefore, although some GLOBE schools have adopted the GLOBE Program as a theme of the period for Integrated Study, entire activities in this period are not devoted to GLOBE Program or environmental learning. The GLOBE Program is one of the themes that are established in each school. The Period for Integrated Study covers various educational themes as environment, welfare, information and international understanding and is comprehensive to let students have the ability of problem solution, featuring in study on the basis language; math; social study; and science. I think there should be smooth integration between GLOBE and other educational fields when the GLOBE Program is adopted into the Period for Integrated Study.

Although the Period for Integrated Study features the various educational themes, I think that GLOBE itself can provide the important themes. It is important that the GLOBE Program is based on the inquired learning method. The period for Integrated Study also has the objective that students observe their surround environments, discover some main topic, make hypotheses and survey to solve the problem. It is inquired learning or problem based learning. The initial work and plan of this school period should be decided by each school, because the topics tried by students varies among schools. GLOBE has recently developed the good effective learning activities using GLOBE Program. These learning activities can provide a chance for the introduction of scientific feature into the Period for Integrated Study.

We have some experiences in inquired process while administrating the GLOBE Program in Japan. In this report, one of them is introduced. The example described by interviewing to the principal of a secondary school in Kyoto is a typical inquired learning activity. GLOBE students of this school measured the water temperature, transparency, pH and electric conductivity in GLOBE hydrology site of a river near the school. They also temporarily expanded the measuring site to upstream and downstream of the GLOBE site during summer vacation. They conducted the same measurements of the GLOBE site upstream and downstream, and discovered a difference of electric conductivity among various measurement points. The values of certain points showed the slightly higher in electric conductivity than other points including GLOBE site. They repeated the measurements and confirmed the difference of values. They couldn't find a reason for the difference in EC values. When a GLOBE student of this school cross the bridge on the river where there are some measurement points, he discovered the fact that water at the point with slightly high value is clean though water at another point is soiled because of reconstruction of a bridge upstream. He considered this carefully and discussed it with students and his teacher. They speculated that the ground water goes into the river. If the students didn't have the experience of conducting a water survey, he would go across the bridge without any such discovery. This shows that GLOBE activities enhance student ability to conduct research.

### **The Issues in the Dissemination of the GLOBE Program in Japan**

#### *Dissemination of meaning of measurements*

Since 2 or 3years ago, many analytical examples of environmental science using GLOBE data have been reported by scientists. These reports have great effects for GLOBE students in gaining an understanding of how the results they produced can be used in analysis of environmental science. The GLOBE Japan Center has the role to disseminate results analyzed by using GLOBE data into Japanese GLOBE schools. We should also try to use the GLOBE data for analysis of the condition of natural environments in Japan and East Asia.

*Development of Such Learning Activities on GLOBE as EILNet*

To raise students' motivation to learn about GLOBE, the learning activities are essential. We feel that the extension of learning activities developed by the US GLOBE center is very important. Therefore, we translated the learning activities on atmosphere and hydrology into a Japanese version that was issued this January. We will issue the second version on soil, land cover and phenology. Moreover, we will try to develop new educational materials and learning activities that enable GLOBE students to understand each aspect of GLOBE protocol and the analytical process of GLOBE data. Since we have experience in creating learning activities that have been introduced in the EILNet program (please refer it in Proceedings of the Sixth Annual GLOBE Conference), we will try to develop new learning activities based on the EILNet.

*Dissemination of Information on Educational Activities in Each GLOBE School and Supporting of Exchange Among GLOBE Teachers*

It is very important that GLOBE teachers are aware of the educational activities of the other GLOBE schools, as the examples in the other schools suggest the educational plan using GLOBE Program. We also need to support the exchange of educational experience among the teachers for dissemination of information on educational methods. We already have offered a mailing list for GLOBE teachers, but its use is not widespread. We will encourage teachers to use this mailing list for the exchange of educational activities.

**GLOBE Student Conference for Exchange**

The exchange of ideas among GLOBE students has great influence on motivation for study. We encourage each school to make a Home Page about GLOBE activities in schools for information extension of students' activities on GLOBE. It had good results for exchange of ideas, however it is necessary to support the exchange of activities with actual interaction. We offered this chance at a conference for GLOBE students this January and saw good results regarding the exchange of students and motivation for learning. (The results of this conference are presented in a poster session of the 7th Annual GLOBE Conference.) The next student conference will be held this fall by the GLOBE Japan Center, with financial support from MEXT.

**Support to Japanese GLOBE Schools for International Exchange**

The GLOBE Program has a feature of international understanding as well as understanding earth systems. Japanese GLOBE students will be encouraged by knowing students who measure environments, analyze GLOBE data and propose the improvement. At the same time, Japanese students who have continued with GLOBE Program activities will provide foreign students with encouragements. The international and mutual relations for good direction is necessary for the GLOBE Program. We will try to give Japanese GLOBE students information about foreign students attempting measurements and analysis of the earth and to offer Japanese GLOBE students and teachers a chance to participate in a conference in Croatia.

**Financial Reinforcement in GLOBE Japan Center**

For the implementation of the above by GLOBE Japan Center, there is financial support. We are trying to get new financial support from companies, but it has not been successful. We will continue to gain financial support.

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Education and Implementation Panel Report:  
Student Research and Collaboration

Results of GLOBE Japan Student Conference

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**Abstract**

We would like to report results of GLOBE Japan Student Conference in the poster session of 7th Annual GLOBE Conference in Chicago. We provided opportunity of GLOBE Student Conference to GLOBE schools for student exchange and collaboration in GLOBE activities. That conference was held at Tokyo on 26-27th of January in 2002. In oral presentation of our conference, the students of 15 Japanese GLOBE schools presented their activities and experiences of GLOBE and environmental observation brought by GLOBE in each school, and exchanged their ideas for observation and conservation of earth and everyday nature in the poster session and table discussion of our conference. Each student gave the information of e-mail address with one another for continuous exchange. After coming back to each school, some GLOBE schools that participated in conference had the time for presentation of result of conference for the other students. We will give participants of Chicago Conference the good lessons when holding GLOBE conference for students.

**Introduction**

On January 26-27, 2002, The GLOBE Japan center held "The GLOBE Japan Student Conference" (JSC) at the National Olympic Memorial Youth Center in Tokyo, Japan, for the purpose of fellowship and research presentation of earth study observation activities done by the students of GLOBE participating schools. At this meeting, based on the survey soliciting students' opinions, we considered the effects that GLOBE activities and "JSC" have on the students' awareness and motivation toward the environment and environmental studies.

**Problems of GLOBE Japan until Now**

Eight years have already passed since the beginning of the activity of GLOBE Japan, and there have been some problems. In the beginning, how to computers are introduced to the school settings and how the schools have access to the network were the problems, but they were solved with the time. However, there are some important issues such as "How should the GLOBE be positioned in the curriculum?" "How can the observation activity be taken into the regular school activities?" and "How are the observation data utilized in educational activities in the classroom?" They are being solved by the practice initiated by the teachers of the participating schools.

**New Problems and "JSC"**

As GLOBE spreads, new problems have surfaced. One of such was the lack of communication among participating students. The use of internet is one of the characteristics of GLOBE, and the

students have been communicating among one another through the use of E-mail, notice board and TV conference system etc. However, they had never had a chance to communicate face to face. In order to continue GLOBE activities, communication is important to share the feeling of oneness as the students work together with the same purpose and to share their own experiences and problems.

Another problem was that the students did not have the opportunity to present the outcomes of their activities. As the measurement and observation continued smoothly and the analyzed data were accumulated analysis, the opportunity to present the result was desired. Among the pilot schools, there were some that used the opportunities of school's annual cultural festivals or whole school meetings. However, there were hardly any schools that presented their outcomes outside the school. It is meaningful to summarize one's thought and communicate it effectively to the others. In the process, students may realize the things which they never thought of. Speaking in front of the audience may motivate the students more. With the two reasons above, the GLOBE Japan decided to hold "JSC".

## Method

In order to investigate the effect that GLOBE activity and "JSC" have on the students' awareness and motivation toward the environment and environmental studies, we discussed the possibility of questionnaire survey. However, considering the limitation of the survey done by the questionnaire, we tried to solicit students' opinions by asking students to write them on Post-it. Students were asked to give their opinions three times during the conference - after the opening ceremony, during the fellowship meeting and before the closing ceremony. Students were not given specific questions. They were asked to share whatever they thought about the following three subjects: (1) what they hope for the conference (we named this subject "the encounter tree"), (2) what they hope for GLOBE, and (3) what they achieved in the conference (we named this subject "the fruitful tree"). After the conference, we categorized the students' comments. As for the effect of "JSC", we compared comments for (1) with that for (3). As for the effect of GLOBE, we looked at comments for (2).

## Program and the Aim of "JSC"

"JSC" was held with the following schedule:

January 26, 2002

10:00 Opening ceremony

10:40 Oral presentation 1

12:00 Lunch time

13:00 Oral presentation 2

13:30 Poster presentation / Poster communication

15:00 Measurement / observation experience activities

17:00 Orientation

17:15 Dinner / Bath time

19:00 Fellowship meeting

22:00 Lights out

January 27, 2002

07:00 Breakfast

09:00 Introduction of the GLOBE activities in foreign countries

09:30 Nature Game session

11:30 Closing ceremony



### **Aim of the programs of “JSC”**

As mentioned in the above, the conference was held to offer a chance for the promotion of communication among students of each GLOBE school. We implemented each program of this conference from the following viewpoints.

#### **\* Oral and Poster Presentations:**

To offer the chance for presentation by participants of each school, the oral and poster presentations were conducted. GLOBE students have never had chance to let the other GLOBE students know their experiences on GLOBE. However, they could discuss the environmental observation related to GLOBE in this conference. Moreover, they could have the time with friendly communication, especially in the poster presentation.

#### **\* Measurement / observation experience activities:**

To get good relation between students and scientists, the faculty members of GLOBE Japan Center in Tokyo Gakugei University directed the learning activities of environmental science in relation to GLOBE Program as a event of this conference. Although GLOBE Program has had the distinctive feature with support of scientist for schools education, there had been a lack of direct communication of face-to-face between students and scientists in GLOBE Japan. In this conference, the students were involved in environmental science by guiding of scientists.

#### **\* Fellowship meeting:**

Even if there is experience that students used e-mail and web chat for communication among GLOBE students, it is also important for students of different schools to see and talk about GLOBE Program friendly and comfortably. Because, it is expected that the communication with the Internet is more significant by face-to-face talking with relax situation. Therefore, in this conference, the participants had chance of relax talking about GLOBE Program, being guided by good facilitators.

#### **\* Introduction of the GLOBE activities in foreign countries:**

Information that many countries and huge foreign students participate in GLOBE Program gives Japanese students encouragement for implementation of GLOBE activities. In this session, we introduced the staffs of GLOBE main office by showing the videotape letter including greeting from them, and let participants see videotape that was made by GLOBE main office.

#### **\* Nature Game session:**

To be aware the everyday nature, the interpreters for nature learning guided participants to world of nature as woodland.

## **Results and Discussion**

### **Outcomes of the GLOBE activities**

There were 115 comments on “hope for the GLOBE activities.” They were roughly categorized into two groups: active hope and passive hope. For example, some of the comments expressing passive hope were, “I want the teacher of other subjects rather than science teacher only, when they accompany us at the time of observation,” and “I want longer activity hours.” These comments are toward the systems of school or the society. On the other hand, comments expressing active hope were, “I want to try many different observation.”, “I want to clean up the river!!”, and “I want to recycle cans.” These comments are categorized into some groups: those

on more interests in the environment and enquiry about better measurements by experiments, such as "I want to take more measurements." And "I want to learn more about the environment."; those on taking action other than measurements, such as "I want to do activities like recycling."; those on interests in domestic and international fellowship, such as "I want to establish fellowship with GLOBE friends around the world."; and those on pride in their own GLOBE activities, such as "I want to let people know about GLOBE. "These voices of students reflect their active involvement in the GLOBE program, and it can be said that it is the outcome of GLOBE.

### **Significance of "JSC"**

Comments for "the encounter tree" and "the fruitful tree" were fifty one and sixty three, respectively. The comments for "the encounter tree" were roughly categorized into three: (1) thirty one on the presentation and activities, (2) thirteen on the fellow ship, and (3) eleven others. When we look at each category, among (1), there were comments that express students determination toward the presentation, such as "I will do my best at the presentation." There were others that express expectation toward the presentation by other students and the activities. As for comments on the fellowship, they ranged from "I want to make new friends." to "I want to know more about GLOBE and natural environment through new friends." The comments for "the fruitful tree" can be categorized roughly into two groups: one on the presentation and activities, and the other on the fellowship. Some students compared their own activities and those of others, and learned some new ideas. In their comments, they expressed that they would like to use the new ideas in their future activities. This indicates that the students are interested in continuing the measurement and observation activities. It seems that there were many opportunities to make new friends at the fellowship meeting, There were comments that they would like to continue the activities exchanging information with new friends.

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